THE DEVELOPMENT OF ENTREPRENEURSHIP IN MALAYSIA: STATE-LED INITIATIVES

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Introduction

This paper provides an overview of the economic development in Malaysia by briefly tracing the economic and industrial activities from its independence up to 2005; there are four phases identified. The industrial development during these phases has led to the rise of entrepreneurship development in Malaysia. The characteristics of entrepreneurship activities are examined then with examples of the state-led initiative projects. Finally, the paper ends with some concluding remarks.

Malaysia's Economic Development

Since achieving independence in 1957, Malaysia's economic development has been impressive. Malaysia ranked 13th of 128 countries in terms of per capita GNP growth rate in 1982, Malaysia made impressive advances towards industrialization during the 1960s and 1970s (See World Bank, 1985:8; Morrison, 1985:13). In 1957, Malaysia's economy was dependent on the primary sector, in which agriculture and mining was a major contributor to GDP as well as employment, generating 45.7 per cent and 61.3 per cent of

GDP and total employment respectively; while the secondary sector, including some light manufacturing, building and construction contributed 11.1 per cent and 9.6 per cent to GDP and employment respectively; and the tertiary sector contributed a significant 43.2 per cent to GDP in 1957 (Okposin, 2000).

In the 1960s, the economic trend shifted from primary sector to industrialization as an import-substitution strategy was adopted to reduce dependency on primary sector and simultaneously diversify the economy, and to create more employment opportunities for the increasing population. Nevertheless, the small domestic market has limited the economy-of-scale, which in turn urged for a change in the economic trend; the attention was then diverted to export-oriented strategy in the 1970s.

Efforts to promote export-oriented strategy were carried out through the implementation of New Economic Policy (NEP), which covered the period of 20 years from 1971 to 1990. The two major NEP objectives were the eradication of poverty and restructuring the society, which aimed to provide the Bumiputeras an average of 30 per cent equity participation in the industrial sector by 1990; it was indeed the turning point for the Bumiputera's involvement in the economic activities. It was also the period that witnessed the growth of the manufacturing sector. The manufacturing sector became the fastest growing sector with a growth rate of 10.4 per cent per annum and surpassed the agricultural sector with the account of 22.6 per cent of GDP in 1987 (EPU, 2004).

Consequently, the second round of import-substitution strategy was briefly applied in the early 1980s as Malaysia was inspired by the economic and technology development of Japan and Korea. The Prime Minister then, Dr.Mahathir emphasized on heavy industries such as iron, steel, cement and cars to produce intermediate goods,

consumer durables, and to generate linkages with the domestic economy through the establishment of Heavy Industries Corporation of Malaysia (HICOM) (Drabble, 2000).

Besides the turning of the economic strategy to industrialization, there were also major shifts in the government policies, namely privatization and Malaysia Incorporated, which again have fostered the growth of entrepreneurship, particularly among the Bumiputeras. By 1990, the equity ratios had changed from 4 per cent in 1971 to 18 per cent in the hands of Bumiputeras; from 34 percent in 1971 to 55 per cent in the hands of non-Bumiputeras; and from 62 per cent to 27 per cent in the hands of the foreigners (Howell, L.D, and Palmer, R.D.F., 1995). The early years of 1990s were of rapid economic growth, in which the GDP grew at 8.5 per cent between 1991 and 1997 with per capita income increasing twofold, and the incidence of poverty falling from 16.5 to 6.1 per cent (EPU, 2004). The 1990s marked Malaysia's transition to high-technology with the NEP being replaced by the New Development Policy (NDP), which aimed to achieve fully developed economy by 2020; it was the beginning of the high technologies and knowledge-intensive era that encompassed all aspects of industrial and entrepreneurial activities.

Methodology

This study applies a simple framework for identifying firms according to their technology entrepreneurship capability level. It employed the World Bank methodology using Bessant's innovation capability audit tool. The framework promoted by the World Bank was adopted and adapted according to the context of the automotive industry in Malaysia. There are six key dimensions identified as the characteristics of technology entrepreneurship, and they are: awareness, core competencies, technology strategy,

technology paradigm, linkages, and learning. These dimensions are referred to the activities that enable firms of the industry to create competitive advantage. These key activities are used as the key indicators in identifying the occurrence of technology entrepreneurship activities throughout the industrial and entrepreneurship development in Malaysia

Entrepreneurship Development in Malaysia

The entrepreneurship development in Malaysia is rooted from the basic trading activities that were in practice prior to independence in 1957. In 1931, Emerson noted that there were 475 Malays, 16,894 Chinese, 4,428 Indians, and 246 Europeans involved in the businesses in the then Federated Malay States of Perak, Pahang, Negeri Sembilan and Selangor (1937:183). In 1954, there were 79,673 business units registered in the then Federation of Malaya (Goh Joon Hai, 1962: 84). Upon achieving independence in 1957, the number of business activities has gradually increased. This study thus categorizes Malaysia's entrepreneurial development into four phases since its independence in 1957 to 2005.

The first phase is from the independence up to the introduction of New Economic Policy (NEP) that is from 1957 to 1970; the second phase is from the introduction of the Second Malaysia Plan up to the end of the Third Malaysia Plan (1971-1980); the third phase is from the establishment of the Fourth Malaysia Plan up to the end of the Fifth Malaysia Plan (1981-1990); and the fourth phase is the initiation of New Development Policy (NDP), and the implementation of Sixth, Seventh and Eighth Malaysia Plans (1991 - 2005).

Phase 1 (1957-1970): Pre-NEP Era

The newly-independent government of Malaysia initiated an essentially laissez-faire economic policy. With regard to industry, for example, it sought simply:

... to create a favourable investment climate and to leave the projects to be undertaken entirely by private enterprises (Hon. Minister of Commerce and Industry, Khir, 1962:3).

This policy has encouraged more people to be involved in entrepreneurial activities as to create private enterprises, and ultimately to undertake significant industrial projects. In the mean time, Malaysia received steadily improved returns for her two main exports, rubber and tin, and was not therefore subject to the same pressures to industrialize as were other Southeast Asian countries at the time (Milne and Mauzy, 1980:324). In view of the rapid industrial development, it was essential for the government to have an active industrial policy.

The government enacted economic measures, and incorporated them into the 'Report of the Industrial Development Working Party 1957. The Working Party, which was appointed in 1956, was given the task of aiding the government in formulating an industrial development policy; the proposal was from the 1955 World Bank Mission (Spinanger, Dean 1986). This industrial development policy actually denoted the beginning of the entrepreneurship effort in Malaysia.

The first major industrialization measure enacted by the first Prime Minister, Tunku Abdul Rahman on 31 July 1958 was aimed at promoting and accelerating the overall industrialization process; that is, to encourage the establishment and development in the Federation of industrial and commercial enterprises by way of income tax relief (Government Gazette, 1958, p.107). This measure, which is known as the Pioneer Industries (Relief from Income Tax) Ordinance, 1958 (hereafter referred to as PIO)

marked the beginning of a conscious effort by the government to promote industrial development in Malaysia (Zainal Abidin Sulong, 1997). The PIO was welcomed warmly by all the manufacturers, and evidently the number of pioneer certificates issued increased rapidly in the years following 1958 (Dean Spinanger, 1986). Simultaneously, the urban areas such as Klang Valley and Selangor were developed, and complimented with infrastructure (railways, power supplies and telephones) and medical services; all of which had led to more entrepreneurial opportunities for the nation with emphasis on technological aspect such as electrical, electronics and mechanical. In 1961, there were 84,930 businesses registered as sole-proprietorship in the then Federation of Malaya (Ungku Aziz, 1962: 10).

In the mean time, there were occurrence of technology transfer activities, particularly in the innovations that were imported like tin dredges, and those innovations that were developed locally like the techniques of rubber production (John H. Drabble, 2000). Such practice ascertained the existence of technology based entrepreneurial activities in Malaysia from as early as 1950s. It also substantiated that entrepreneurs then had already participated in minor improvement activities, which is part of the innovation activity.

The rapid establishment of industrial estates in Malaysia has created more entrepreneurial opportunities for the nation, and as it is industrial estates, the focus was on technology development. The growth of new industries marked the increasing involvement of the nation in entrepreneurial activities that are technology oriented. The successful establishment of Petaling Jaya in 1952 had induced additional industrial estates such as Mak Mandin in Penang, Tasek in Perak, Larkin and Tampoi in Johor, Shah Alam in Selangor, and Senawang in Negeri Sembilan. Subsequently, to encourage

more participation of the entrepreneurs in the industrial estates development, the government established the Malaysian Industrial Development Finance Ltd. (MIDF) in March 1960 specifically to assist private enterprises in terms of medium to long-term loans; equity purchasing; and other services. The financial assistance provided by the government then was seen as an effort to further encourage entrepreneurial activities in Malaysia.

The subsequent years of 1960s was marked as the beginning of import-substitution economic activities; industries to substitute imports such as food, beverages and tobacco, printing and publishing, building materials, chemicals and plastics grew rapidly (Zainal Abidin Sulong, 1997). The government pursued a policy of diversification in its economic structure, which includes not only primary commodities but also manufactured products. The various industrialization policies were coordinated by the Federal Industrial Development Authority (FIDA) established in 1965, and renamed as Malaysian Industrial Development Authority (MIDA) in 1978. Meanwhile, official policy towards industrialization began to change after 1965 in response to a decline in industrial growth and to the separation from the industrialized Singapore (Singapore joined the Federation two years earlier) (Alaisdair Bowie, 1988). The second decade after independence has thus concentrated on intensifying and regionalizing industrialization policies. In short, it should be noted that it was during this first phase that the entrepreneurial activities have taken its path, particularly towards industrial based.

Phase II (1971-1980): Industrialization under NEP Era

The second phase was categorized by the developments under the New Economic Policy (NEP), but only up to the Third Malaysia Plan. Though the NEP is a 20 years

development programme and spanned over four Malaysia Plans, this second phase looks specifically into the industrial activities during the Second Malaysia Plan (1971-1975), which emphasized on the manufacturing sector and during the Third Malaysia Plan (1976-1980), which focused on new strategies to spur the economic growth of the Bumiputera community. The NEP aimed to provide opportunity for greater Bumiputra participation in the manufacturing sector in terms of equity, employment, marketing and professional services. (Okposin, S.B., Abdul Halim Abdul Hamid and Boon, O.H., 1999, p.208).

The incident of 'racial-riot' in 1969 has led to the restructuring of equity ownership. Under the New Economic Policy (NEP), the economic equity ratio was distributed to 30 per cent for the Bumiputeras; 40 per cent for the non-Bumiputeras; and 30 per cent for the foreigners by 1990 (Howell, L.D. and Palmer, R.D.F.,1995). It was also targeted in the Second Malaysia Plan that the Bumiputeras will have at least 30 per cent ownership of the total commercial and industrial activities within two decades (Malaysia Plan II). The NEP through the Second Malaysia Plan has marked the beginning of the indigenous group's involvement in economic activities, and simultaneously in entrepreneurial activities as illustrated in the table1 below.

Table 1: Ownership and Participation in Industrial & Commercial Sectors 1970, 1975

		1970	1975
Industry	Mining Manufacturing Construction	0.8% 0.9% 3.8%	2.1% 3.6% 4.5%
Trade	Wholesaling Retailing	0.7% 3.0%	1.7% 4.2%
Transport	Taxi Bus	47.7% 18.0%	65.5% 18.6%

	Haulage	14.5%	39.0%

Source: Fourth Malaysian Plan, 1981, 64.

The table above shows the participation of the Bumiputera group in various sectors that included industry, trade and transport. These sectors indicate that there is the involvement of technological component regardless of the quantity in the respective activities carried out.

In all, the participation of the locals, including the Bumiputeras and the non-Bumiputeras has increased gradually in the corporate sector since the implementation of NEP. The table 2 below shows the ownership and control of the Bumiputeras, non-Bumiputeras and Foreigners in the corporate sector for the years 1970, 1975 and 1980. The NEP has successfully increased the participation of the locals in the commercial and industrial activities on one hand, and decreased the involvement of the foreigners quite drastically on the other hand.

Table 2: Malaysian Ownership and Control of the Corporate Sector 1970-80 ($Mil)

	1970	%	1975	%	1980	%	Annual Growth Rate 1972-80 %
a)Bumiputera Individuals[1]	84.4	1.6	549.8	3.6	1880.0	5.3	23.5
b)Bumiputera Trust Agencies[2]	41.2	0.8	844.2	5.6	2170.4	6.7	39.0
c) Other Malaysians[3]	1826.5	34.3	5653.2	37.5	14442.9	44.6	18.8
d) Foreigners	3377.1	63.3	8037.2	53.3	13927.0	42.9	13.3
Total	6541.1	100.0	15084.4	100.0	26323.0	100.0	16.7

Source: Adapted from Third Malaysia Plan, 1981: 99, and Forth Malaysia Plan, 1985: 62 and Mid-term Review of FMP, 1984:11

Notes:
1. Includes institutions channeling funds of individual Bumiputeras such as Lembaga Urusan dan Tabung Haji, Amanah Saham Mara, and cooperatives.
2. Shares held through institutions classified as Bumiputera trust agencies such as PERNAS, MARA, UDA, SEDCs, Bank Bumiputera, BPMB, FIMA, and PNB. Previously this item was classified as Bumiputera interests.
3. Includes shares held by nominee and other companies.

Besides increasing the participation of the locals in commercial and industrial activities, specific poverty redressal projects were carried out to increase the participation of the Malays and other indigenous people in the modern sectors of the economy in the 1970s (Malaysia Plan, 1976, p.39). For this purpose, a number of public enterprises were set up and these public enterprises were classified into departmental enterprises, statutory bodies and government-owned private or public limited companies (Gomez, E.T. and Jomo, K.S., 1995). The departmental enterprises were mainly those responsible for providing public services such as water supply, telecommunications, civil aviation and refuse collection; the statutory bodies were established by law at federal and state levels such as the Malaysian Industrial Development Authority (MIDA), the Tourist Development Corporation (TDC), the Urban Development Authority (UDA), Petroliam Nasional Berhad (PETRONAS), States Economic Development Corporations (SEDC), and lastly the government-owned private or public limited companies were established under the Companies Act (1965), whose equity holdings were either fully or partially held by the government such as Heavy Industries Corporation of Malaysia (HICOM), property developer PEREMBA Berhad, and Food Industries of Malaysia (FIMA) (M.Fazilah, 2002).

Other than that, the government initiated programmes to establish export-oriented industries in Malaysia, using Pioneer Industry status, Export Processing Zones and

numerous other incentives (Tan, 1983:65-73; Ariffin, 1983:52). It was during this period of 1970s, labour intensive and export oriented industries were actively promoted; Foreign Direct Investment (FDI) attracted by the liberal government policies on equity, tax incentives and the provision of extensive infrastructure including Free Trade Zones (FTZ) and Licensed Manufacturing Warehouses (LMW) flowed into the country, and simultaneously laid the foundation of the nation's transition to hi-tech industries (Zainal Abidin Sulong, 1997).

Nevertheless, these activities were relatively less significant in fostering technology transfer among the nations. Most of the local entrepreneurs did not acquire technological know-how and know-what successfully though there were many technological transfer activities occurred between the foreign and local firms during this period. The local entrepreneurs were lacking in the capability to acquire, understand and adapt the technology to the local needs. Simply noting, the government's effort towards industrialization was less supported by the local entrepreneurs in terms of their technology acquisition.

Phase III (1981-1990): Industrialization under Mahathir's Era

The third phase was during the implementation of the Fourth Malaysia Plan, which covered the years from 1981 to 1985, and the Fifth Malaysia Plan, which included the years from 1986 to 1990. The Fourth Malaysia Plan emphasized on export earnings, particularly on the agricultural sector, and the Fifth Malaysia Plan focused on the manufacturing sector with the implementation of various industrial policies and strategies such as the 'Malaysia Incorporated' policy, privatization policy and the 'Look East' policy. The policies implemented since the early 1980s consistently were meant to

uphold and advance certain business interests that seemed to have strong influence over national leadership (Jomo, 1989).

The third phase was the beginning of a new political leadership under Dr. Mahathir. He became the Prime Minister in mid 1981, and initiated a number of efforts towards industrialization, notably of heavy industries. The establishment of Heavy Industries Corporation of Malaysia (HICOM), a government agency in 1981 by Mahathir signified the beginning of heavy industries in Malaysia. The aim was to transform Malaysia from relatively small-scaled and labor intensive to sophisticated and capital-intensive heavy industry; to create a number of "nucleus" industries such as steel, cement, sponge iron and heavy engineering; and for other industries to evolve from it such as pulp and paper, small engines and auto manufacturing (Alasdair Bowie, 1988). Other heavy industrial projects developed outside the auspices of HICOM were: the ASEAN/Malaysia Urea fertilizer project, Liquified Natural Gas (LNG) exporting facilities, PETRONAS oil and gas refineries, and several petrochemicals plants (Dhanji et al., 1983:39). It is obvious that in all the suggested projects and activities by the government during this third phase, there is the involvement of technological component. This indicates that the nation's drive was towards technology based entrepreneurial activities, which ultimately has urged the entrepreneurs to be equipped with adequate knowledge-base that includes codified and tacit knowledge.

The development and success of the Newly Industrialized Countries (NICs) like Japan, South Korea and Taiwan have inspired the then Prime Minister to introduce the 'Look East' policy in 1982, and other projects introduced were referred to the examples from these countries. Indeed, the economic policies from the early 1980s seeked to transform Malaysia into a newly industrialized country (NIC) like South Korea; less

dependent on the developed industrial nations; and under genuine Bumiputera capitalist entrepreneurial leadership (Jomo, 1989). In the attempt to follow the Japanese and South Korean models, the Malaysian government set up partnerships in petrochemicals, iron and steel, cement, paper and pulp, and motor vehicles. In particular, Malaysia established partnership with 'Mitsubishi' of Japan in its national automotive project initiative.

However, the government had to switch to austerity measures at the end of 1982 as the recession deepened, reducing public spending in most areas except HICOM's sponge iron, cement, small engine and auto projects (Alasdair Bowie, 1988). Of these few exempted areas, the automotive project is of interest for this study to examine, for it is among the industrial sectors that has high technological components. Besides that, the automotive sector is a representative of other sectors as a complete car consists of thousands of parts and components that are made of various sectors such as rubber, metal, plastic, glass, fabric and others.

Additionally, the automotive sector was selected due to the high priority and protection provided by the government in its effort to encourage Bumiputera participation in the industrial sector, which was previously dominated by the Chinese and the foreigners. It also has provided job opportunities and reduced the unemployment rate. Most important of all, it has created a huge number of small and medium enterprises as vendor firms supplying parts and components to the national car maker, Proton.

Besides the austerity measures, the government introduced Industrial Master Plan (IMP) in 1986, aimed to diversify the industrial base and promote new sectors of growth. A plan-rationale approach to industrial development was adopted by the IMP, and it was based on the strategy followed by Japan and the Republic of Korea in their successful economic reconstruction after the Second World War and the Korean War, respectively

(www.unescap.org). Hence, the IMP was formulated to guide the development of the manufacturing sector, notably in conveying the government's intention to the private investors in terms of industrial development, which is indeed seen by this study as part of the government's effort for entrepreneurship development.

Several key industrial clusters were identified in the IMP that required critical efforts in deepening the industrial structure as a whole; they were the electrical and electronics products, transportation equipment, chemicals, textile & apparel, materials, food processing and machinery & equipment (Zainal Abidin Sulong, 1997). These key industrial clusters together with their subgroups are listed in the table 3 below.

Table 3: Key Industrial Clusters and Subgroups

Key Industrial Cluster	Subgroups
Electrical and electronics products	(a) Consumer electronics (b) Semiconductors and electronics components (c) Computers, peripherals and telecommunications equipment (d) Electrical appliances and electronic apparatus
Transportation equipment	(a) Automotive and motorcycles (b) Aerospace (c)Shipbuilding and repairing (marine transportation)
Chemicals	(a) Pharmaceuticals (b) Petrochemicals (c) Palm oil products
Textiles and apparel	
Materials	(a) Wood-based products and furniture (b) Rubber-based products (c) Advanced materials
Food processing	(a) Meat and seafood products (b) Cocoa and confectionery (c) Fruit and vegetable products
Machinery and equipment	

(Source: Zainal Abidin Sulong, 1997)

Such clustering was helpful in the effort to further foster entrepreneurship development in Malaysia. The third phase is thus seen as the diversification of economic activities that have transformed the focus from industrialization to entrepreneurship development.

Phase IV (1991- 2005): High-Tech Based Industries

The period of 1991-2005 witnessed great increase of government investment in heavy industries of high technologies; it covered the period of Sixth Malaysia Plan (1991-1995), Seventh Malaysia Plan (1996-2000) and Eighth Malaysia Plan (2001-2005). This phase emphasized on the quality of small and medium scale Bumiputera enterprises rather than on increasing the number of Bumiputera entrepreneurs; new requirements was introduced by the government in order to achieve a more equitable share of equity ownership among the various ethnic groups (M.Fazilah, 2002).

Additionally, the Eighth Malaysia Plan narrowed to sustaining economic growth and competitiveness in facing the challenges brought by the globalisation and liberalization phenomena. The announcement of the New Development Policy (NDP) as a successor to NEP in June 1991 voiced the then Prime Minister, Dr. Mahathir's new vision, 'Vision 2020', which aimed to eliminate hard-core poverty and reduce relative poverty; it focused on the rapid development of "an active Bumiputera Commercial and Industrial Community (BCIC) as an essential strategy to increase and render permanent Bumiputera participation in the economy" (Llewellyn D. Howell and Ronald D.F.Palmer, 1995). The NDP is also a policy that aimed to transform the nation from an agricultural to an industrialized nation by the year 2020. Thus, the beginning of the first half of the 1990s economic development placed the nation at a transition stage to capital-intensive, high-tech and high value-added industries (Zainal Abidin Sulong, 1997).

It is also a transition to the merge of the technological and commercial activities, which integrates and combines two different fields, technology and entrepreneurship. The technology component is embedded within the entrepreneurial activities. Technology is then regarded the fundamental ingredient in every entrepreneurial activity, from the initiation of a business opportunity up to the commercialization of the products or services produced. Thus, technology entrepreneurship activities are referred to those activities that enable firms to achieve competitive advantage.

Most of the technology entrepreneurship activities were developed with reference to the World Bank methodology for acquiring data on firms' capabilities (Bessant et al., 2001). Upon identifying the six key activities, the technology entrepreneurship practice was traced from Phase I to Phase IV of the industrial development to witness the technology entrepreneurship practice during the period from 1957 to 2005; the result of the findings is presented in table 4 below.

Table 4: Technology Entrepreneurship Activities

No.	Technology Entrepreneurship Activities	Phase I	Phase II	Phase III	Phase IV
1	Learning	/	/	/	/
2	Core Competency	-	-	/	/
3	Technology Paradigm	-	-	-	/
4	Technology Strategy	-	-	-	/
5	Linkages	-	/	/	/
6	Awareness	/	/	/	/

The learning activity is referred to the ability of the entrepreneur and its employees in acquiring knowledge-base to exploit available opportunities, and ultimately improve the

performance of the firm; it includes both tacit knowledge, which is accumulated from experience, and codified knowledge, which is obtained from formal learning.

Core competency is the strength of a firm that needs to be identified and built upon. The building of distinctive core competency is necessary for a firm to compete successfully with its competitors, and for sustainable competitiveness, the firm has to continuously develop its core competencies.

Technology paradigm is the ability to understand the existing platform of technology, and it provides a solution ''model' for the problems faced. It is essential for the entrepreneur and firm's employees to have knowledge on technology paradigm in order to carry out innovation or improvement activities. Technology strategy is the plan of action for short-term and long-term goals that are significant for the growth of the firm. It is necessary for a firm to plan in advance so as to anticipate any environmental and technological changes.

Linkages are vitally essential for knowledge and technology sharing. It includes any form of collaborative effort that a firm takes to build and develop its core competencies. In term of awareness, it is referred to the ability to recognize environmental changes, namely policy changes.

These technology entrepreneurship activities have emerged since Phase I and Phase II but at a minimum pace. Majority of the technology entrepreneurship activities have started appearing in Phase III, which is believed as the result of the introduction of forth and fifth Malaysia Plans that had put emphasis on heavy industrial development. Consequently, other government policies implemented were also in the direction of fostering entrepreneurship development in the manufacturing sector; for example, Malaysia Plan Six to Malaysia Plan 8 (MP6 to MP8)) and Industrial Master Plan I to

Industrial Master Plan II (IMP1 to IMP2). However, the most obvious governmental influence on the development of technology entrepreneurship is seen in Phase IV as presented in table 4. Phase IV indicated that technology entrepreneurship has been a practice during this period, but the extent of the practice is not known.

In addition, the government has identified 10 industrial sectors, subsectors and activities in the areas of new and emerging technologies as a way to promote high-tech products and activities. These industrial sectors and subsectors are as demonstrated in the table 5 below.

Table 5: High-tech Industries and Subsectors

High-Tech Industries	Subsectors
Advanced electronics	1. Design, development and manufacture of: (a)computer or peripherals (b)microprocessor application 2. Development and production of communication equipment 3.Design and production of integrated circuits (IC)
Equipment/Instrumentation	1. Design, development and manufacture of: (a)medical equipment (b)medical implant or devices (c)scientific equipment 2. Development and production of high pressure water cutting equipment
Biotechnology	1. Development, testing and production of: (a)pharmaceuticals (b)fine chemicals (c)food or feed supplements (d)biodiagnostics 2. Development and production of: (a)cell cultures (b)biopolymers 3. Development and production of biotechnology processes for waste treatment
Automation and flexible manufacturing systems	1. Development and production of: (a)computer process (b)process instrumentation

High-Tech Industries	Subsectors
	(c)robotic equipment (d)computer numerical control (CNC) machine tools
Electro-optics and non-linear optics	1. Development and production of: (a)optical lenses (b)laser application equipment (c)fibre-optic communications equipment
Advanced material	1. Application or production of: (a)polymers or biopolymers (b)superconductors (c)fine ceramics or advanced ceramics (d)high strength composites
Optoelectronic	1. Development and production of: (a)optoelectronic system components (b)optical system components (c)photo-couplers (d)semiconductor lasers
Software engineering	1. Development and production of: (a)neural networks (b)pattern recognition systems (c)machine vision (d)fuzzy logic systems
Alternative energy resources	1. Development and production of: (a)fuel cells (b)polymer batteries (c)solar cells (d)renewable energy
Aerospace	1.Manufacture and assembly of aircraft 2.Manufacture of aircraft equipment, components, accessories or parts thereof 3. Modification and conversion of aircraft 4.Refurbishment or re-manufacture of aircraft equipment, components, accessories or parts thereof

Source: Zainal Abidin Sulong, 1997

These areas are still under the experimentation stage, and therefore it is not viable for the study to look into the areas of high-tech, or take up a study on any of such sector. On top of it, there is not any remarkable success of the high-tech projects as to date, for most of

these projects are at the stage of research and development; they can be considered as still at the infant stage of development that have to undergo more 'trial and testing' effort. Therefore, this paper does not discuss any of the above listed high-tech projects; instead, the study addresses the initial heavy industrial state-led project that has driven the nation's interest towards technology-based entrepreneurship, namely the automotive project.

The national automotive sector is Malaysia's pioneer industrial project that carries technological component throughout its value chain, from the making of the smallest nut and bolt to the assembly of a complete car. With that, this study believes that a study in the automotive sector is the most appropriate in understanding technology entrepreneurship development in Malaysia. The growth and success of the automotive industry had given an essential positive impact to the society. It had created job opportunities; raised living standard, reduced poverty, created entrepreneurial opportunities, developed the industrial sector of involved countries, provided the gateway for the acquisition of relevant technological knowledge and technical skills, and encouraged innovation, research and development activities. As the socio-economic impact of the automotive sector is remarkable, it is worth to study such an industry that is a representative of other industries, as cited below:

> The automobile industry stands for modern industry all over the globe. It is to the twentieth century what the Lancashire cotton mills were to the early nineteenth century: the industry of industries. (Drucker, 1946, p.149)

Conclusion

This chapter concludes with a table of summary, which sums up all the four phases of industrial and entrepreneurship development in Malaysia.

Table 6: Summary of Four Phases of Malaysia's Economic Development.

Phases	Phase I (1957-1970)	Phase II (1971-1980)	Phase III (1981-1990)	Phase IV (1991-2005)
Political Leader (Prime Minister)	Tunku Abdul Rahman, Tun Abdul Razak	Tun Abdul Razak, Tun Hussein Onn	Tun Dr. Mahathir Mohammad	Tun Dr. Mahathir Mohammad
Policies	1MP	2MP, 3MP, NEP	4MP, 5MP, NEP, IMP	6MP, 7MP, 8MP, NDP, IMPII
Emphasis	Import Substitution - Agriculture	Export Orientation – FDI, FTZ, LMW (Electronics Industry)	Import Substitution (2nd Stage) – Heavy Industries, Cluster-based Strategy	Import Substitution (2nd Stage) – High Technology, K-economy, High Value Added
Achievement	National Amenities, Socio-economic development	Entrepreneurship – small medium industries	Industrial entrepreneurship – heavy industries (HICOM)	Technological entrepreneurship – high-tech

The technology entrepreneurship practice has obviously occurred in Malaysia since the past two decades or specifically since the Phase III but there were already minimum occurrence of technology entrepreneurship practices during the Phase I and Phase II period. Meanwhile, the entrepreneurship practice during the 1950s and 1960s was merely in the form of trading. There was not much involvement of technological component. As Malaysia's economic development moved towards industrial based, the entrepreneurial activities simultaneously went in similar direction, emphasizing on the industrial sector that are technology oriented. The introduction of the New Economic Policy (NEP) in 1971 by the second Prime Minister, Tun Abdul Razak was the initial effort towards technology entrepreneurship development in Malaysia.

The government of Malaysia initiated aggressive effort to encourage the industrial sector development, and the implementation of NEP has encouraged the Bumiputeras to participate actively in major economic sectors, which was previously dominated by the Chinese and foreigners. The beginning of Dr. Mahathir's leadership has also fostered the growth of new industrial sectors with particular emphasis on heavy industries, of which HICOM was established. The economic recession that occurred in the 1980s has agitated the development of heavy industries in Malaysia. As a result, only two industries survived; they were the steel and automotive sectors. These two sectors were given greater priority by the government due to their economic influence such as creating a large pool of employment and entrepreneurial opportunities. This study thus looks into the automotive sector due to its representation of other industrial sectors, the creation of large number of entrepreneurs who served as vendors or suppliers to the national car manufacturer, and the utilization of technological component more forcefully throughout its value chain.

He also implemented a number of policies to encourage the usage of technology component, the acquisition of technology through technology transfer, and finally to create awareness of the public on the significance of technology in the new era of globalization and liberalization. In addressing the technological changes, government plans were aimed to focus on sustaining economic growth and competitiveness (MP 8). The concern was also to increase Bumiputera participation in major industrial sectors as well as to create Bumiputera Commercial and Industrial Community (BCIC). The NDP has shifted the economy from industrial based to capital-intensive, high-tech and high value-added industries. In line with this, six key activities that enable firms to achieve competitive advantage were identified using the World Bank methodology for acquiring

data on the capabilities of the vendor firms (Bessant et al., 2001). As they were traced from 1957 to 2005, the study noted that technology entrepreneurship activities have existed since the first phase but at a minimum pace, and it became visible in phase three and was obvious in phase four.

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